



TLP1014, TLP1015

TOSHIBA PHOTointERRUPTER INFRARED LED + PHOTO IC

TLP1014, TLP1015

HOME ELECTRIC EQUIPMENT SUCH AS VCR, CD PLAYER

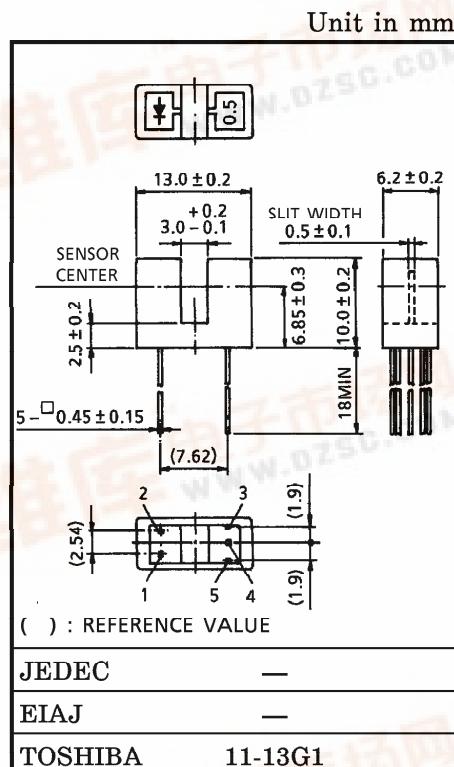
OA EQUIPMENT SUCH AS COPYING MACHINE, PRINTER,
FACSIMILE, ETC.AUTOMATIC SERVICE EQUIPMENT SUCH AS VENDING MACHINE,
TICKETING MACHINE, ETC.

VARIOUS POSITION DETECTION

TLP1014 and TLP1015 are digital output photointerrupters combining GaAs infrared LED with high sensitive and high gain Si photo IC.

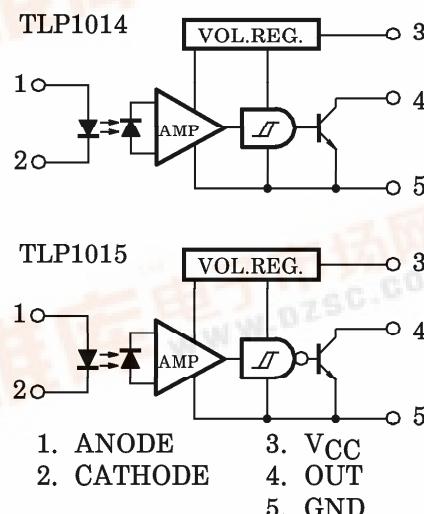
Directly connectable to TTL, LSTTL and CMOS.

- Printed wiring board direct mounting type
- Gap : 3mm
- Resolution : Slit width 0.5mm
- Digital output (Open collector)
 - TLP1014 : Low Level output at shielding
 - TLP1015 : High Level output at shielding
- Built-in Schmitt trigger circuit
- Threshold input current : 4mA (max) at Ta=25°C
- Operating supply voltage : VCC=4.5~17V
- High speed response
- Detector side is of visible light cut type.



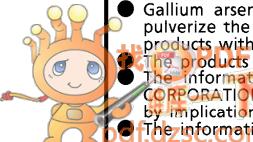
Weight : 0.8g (typ.)

PIN CONNECTION



961001EBC2

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MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	I_F	50	mA
	Forward Current Derating ($T_a > 25^\circ\text{C}$)	$\Delta I_F / ^\circ\text{C}$	-0.33	mA / $^\circ\text{C}$
	Reverse Voltage	V_R	5	V
DETECTOR	Supply Voltage	V_{CC}	17	V
	Output Voltage	V_O	30	V
	Output Current	I_O	50	mA
	Power Dissipation	P_O	250	mW
	Power Dissipation Derating ($T_a > 25^\circ\text{C}$)	$\Delta P_O / ^\circ\text{C}$	-3.33	mW / $^\circ\text{C}$
	Operating Temperature Range	T_{opr}	-25~85	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-40~100	$^\circ\text{C}$
Soldering Temperature (5s)		T_{sol}	260	$^\circ\text{C}$

RECOMMENDED OPERATING CONDITION

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
LED Forward Current	I_F	14*	—	20	mA
Supply Voltage	V_{CC}	4.5	5.0	17	V
Output Voltage	V_O	—	5.0	24	V
Low Level Output Current	I_{OL}	—	—	16	mA
Operating Temperature	T_{opr}	-25	—	85	$^\circ\text{C}$

* 14mA is a value considering 50% LED deterioration.

Initial value of threshold input current is 7mA.

OPTO-ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $T_a = -25\text{~}85^\circ\text{C}$, $V_{CC} = 5\text{V} \pm 10\%$)

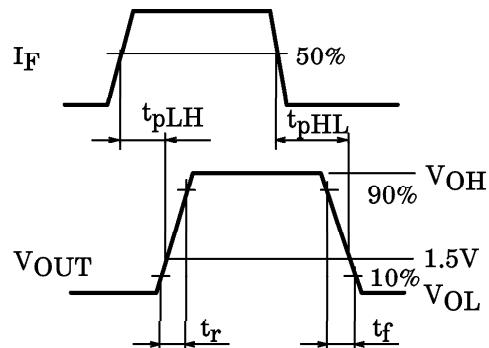
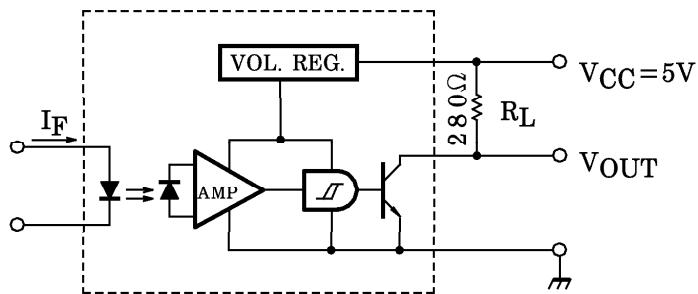
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT		
LED	Forward Voltage	V_F	$I_F = 10\text{mA}$, $T_a = 25^\circ\text{C}$	1.00	1.15	1.30	V		
	Reverse Current	I_R	$V_R = 5\text{V}$, $T_a = 25^\circ\text{C}$	—	—	10	μA		
	Peak Light Emission Wavelength	λ_p	$I_F = 15\text{mA}$, $T_a = 25^\circ\text{C}$	—	940	—	nm		
DETECTOR	Operating Supply Voltage	V_{CC}			4.5	—	17	V	
	Low Level Supply Current	I_{CCL}	$I_F = *1$	—	—	5.0	mA		
			$I_F = *1$, $V_{CC} = 17\text{V}$	—	—	5.2			
	High Level Supply Current	I_{CCH}	$I_F = *2$	—	—	3.0	mA		
			$I_F = *2$, $V_{CC} = 17\text{V}$	—	—	3.2			
	Low Level Output Voltage	V_{OL}	$I_{OL} = 16\text{mA}$, $I_F = *1$ $T_a = 25^\circ\text{C}$	—	0.07	0.3	V		
			$I_{OL} = 16\text{mA}$, $I_F = *1$ $V_{CC} = 17\text{V}$	—	—	0.4			
COUPLED	High Level Output Current	I_{OH}	$I_F = *2$, $V_O = 30\text{V}$	—	—	15	μA		
	Peak Sensitivity Wavelength	λ_P	$T_a = 25^\circ\text{C}$	—	900	—	nm		
	L→H Threshold Input Current	I_{FLH}	$T_a = 25^\circ\text{C}$	TLP1014	—	—	4	mA	
			$V_{CC} = 17\text{V}$		—	—	7		
	H→L Threshold Input Current	I_{FHL}	$T_a = 25^\circ\text{C}$	TLP1015	—	—	4	mA	
			$V_{CC} = 17\text{V}$		—	—	7		
	Hysteresis Ratio	I_{FHL}/I_{FLH}	—	TLP1014	—	0.67	—	—	
				TLP1015	—	1.5	—		
	Propagation Delay Time (L→H)	t_{pLH}	$V_{CC} = 5\text{V}$ $I_F = 15\text{mA}$ $R_L = 280\Omega$	TLP1014	—	3	—	μs	
	Propagation Delay Time (H→L)	t_{pHL}		TLP1015	—	6	—		
				TLP1014	—	6	—		
				TLP1015	—	3	—		
	Rise Time	t_r	$T_a = 25^\circ\text{C}$ (Note)	—	0.1	—			
	Fall Time	t_f		—	0.05	—			

*1. 0mA for TLP1004A. 15mA for TLP1005A.

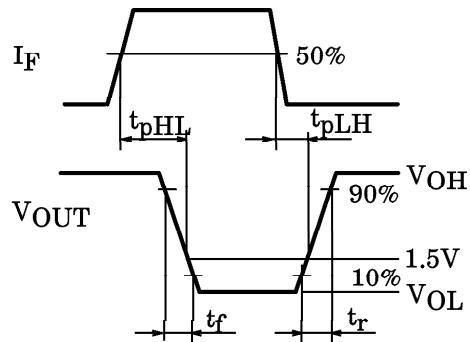
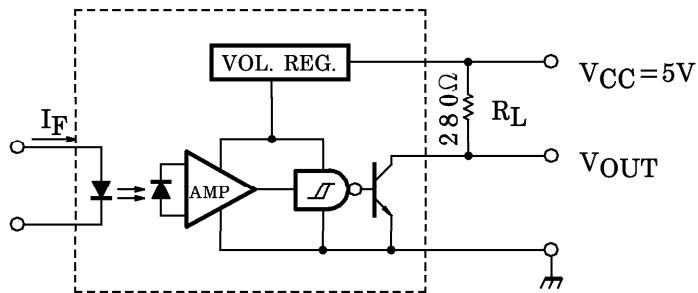
*2. 15mA for TLP1004A. 0mA for TLP1005A.

Note : SWITCHING TIME TEST CIRCUIT

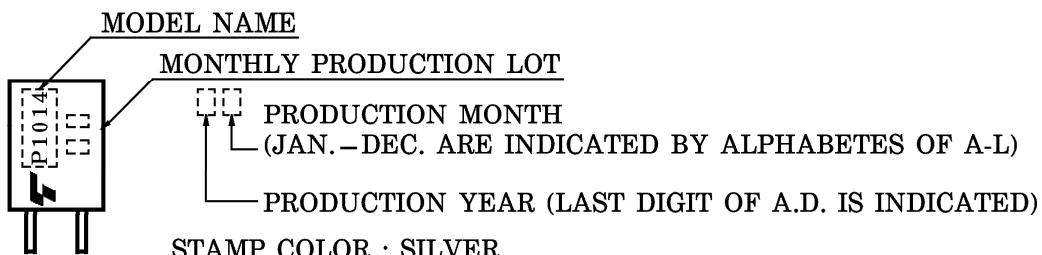
TLP1014



TLP1015



PRODUCT INDICATION



STAMP COLOR : SILVER

ABBREVIATION	TYPE
P1014	TLP1014
P1015	TLP1015

PRECAUTION

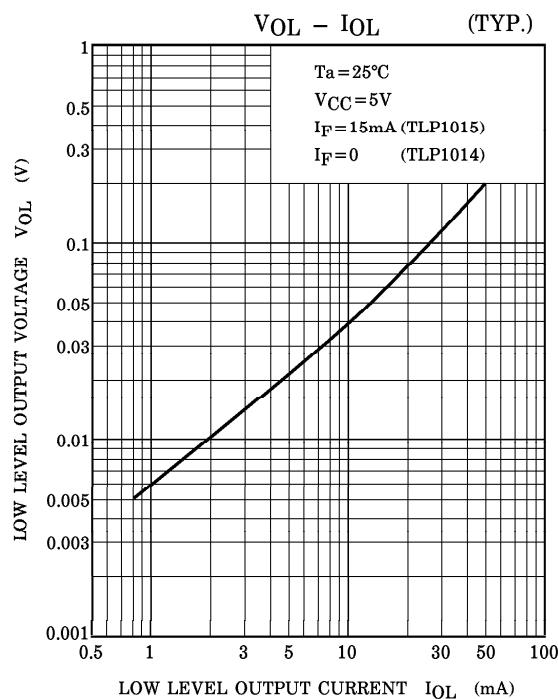
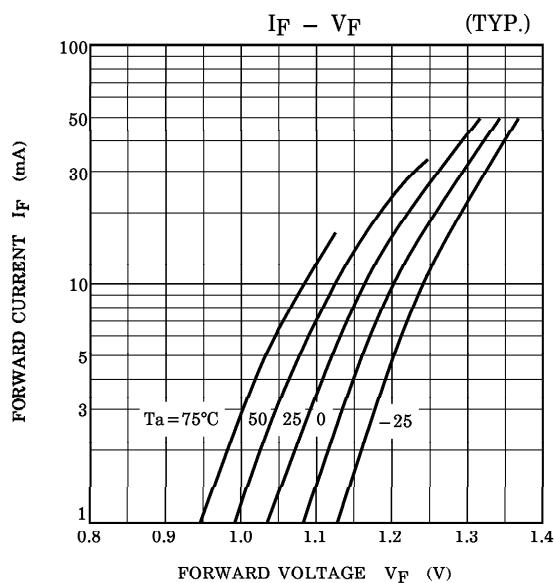
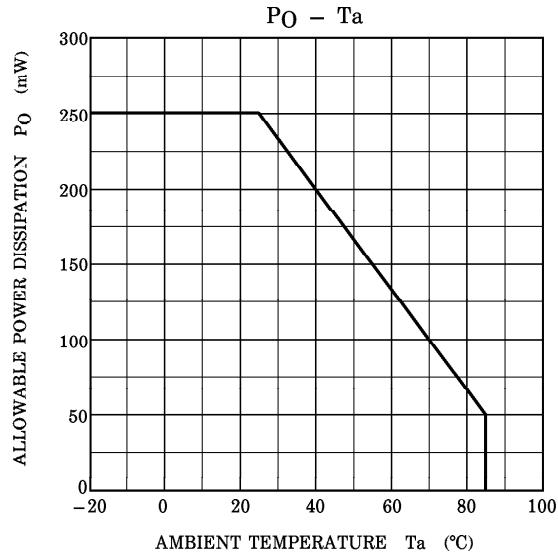
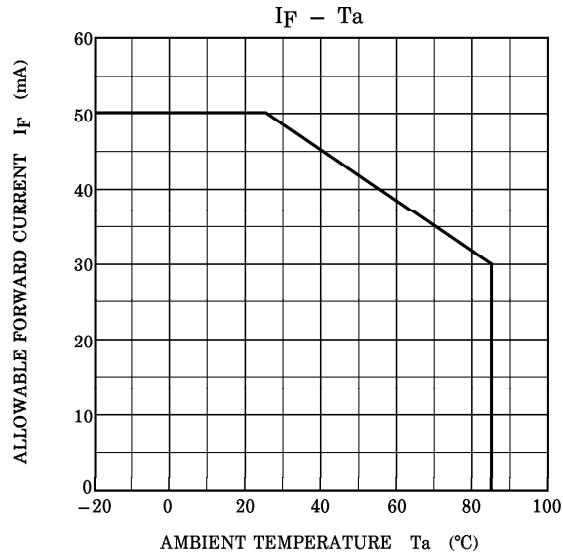
Please be careful of the followings.

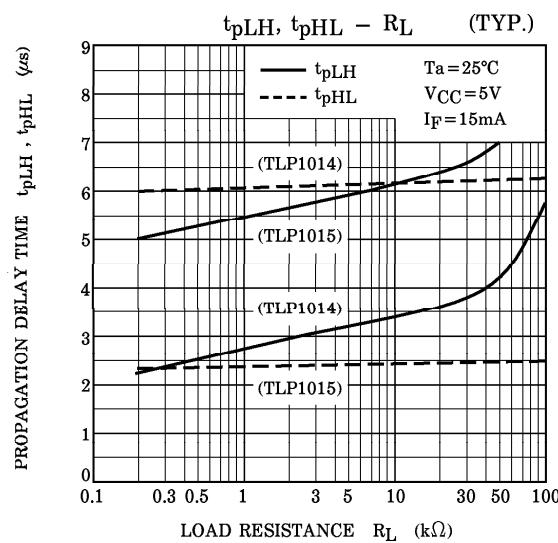
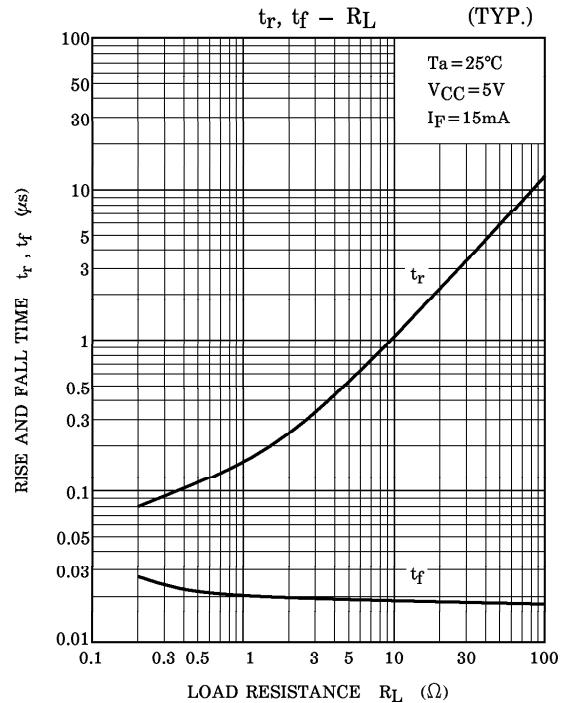
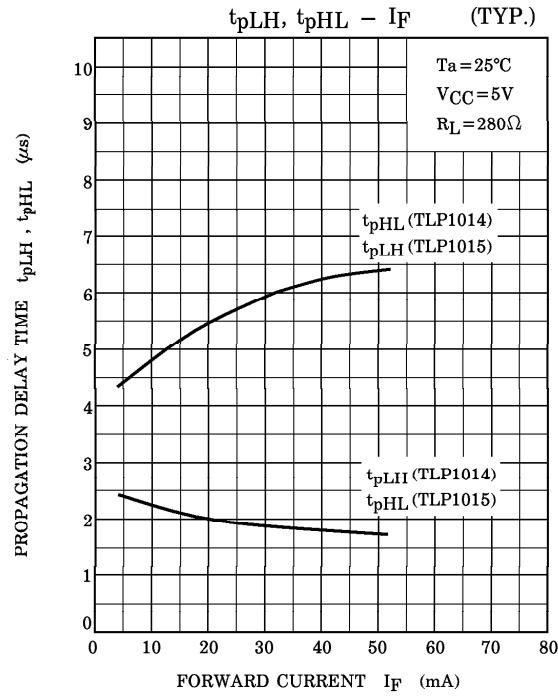
1. Soldering should be performed after lead forming.
2. If chemicals are used for cleaning, the soldered surface only shall be cleaned with chemicals avoiding the whole cleaning of the package.
3. The container is made of polycarbonate. Polycarbonate is usually stable with acid, alcohol, and aliphatic hydrocarbons however, with pertochemicals (such as benzene, toluene, and acetone), alkali, aromatic hydrocarbons, or chloric hydrocarbons, polycarbonate becomes cracked, swollen, or melted. Please take care when choosing a packaging material by referencing the table below.

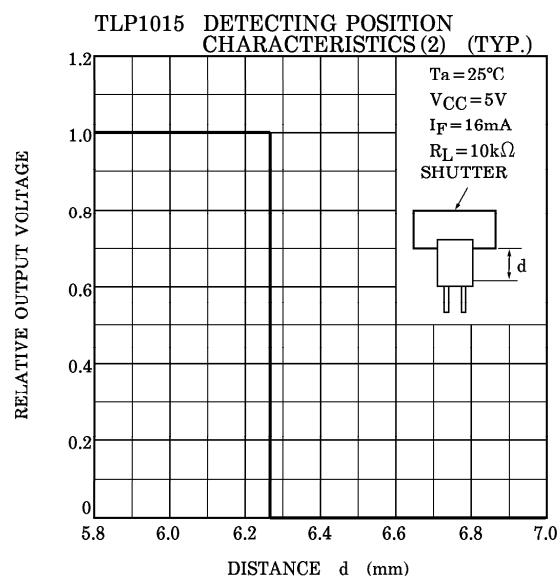
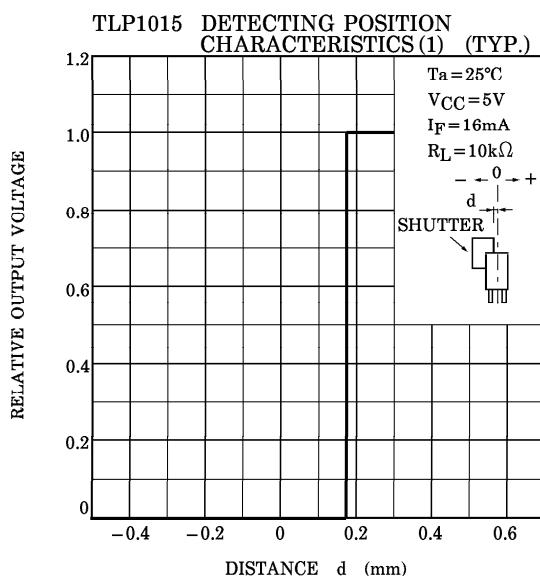
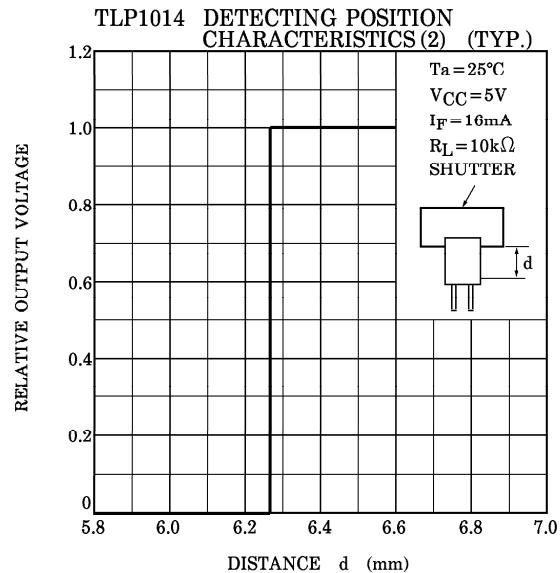
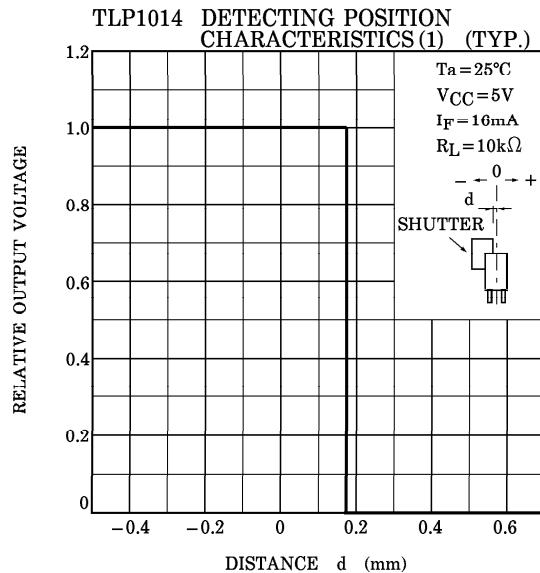
<Chemicals to avoid with polycarbonate>

	PHENOMENON	CHEMICALS
A	Little deterioration but staining	<ul style="list-style-type: none"> • nitric acid (low concentration), hydrogen peroxide, chlorine
B	Cracked, crazed, or swollen	<ul style="list-style-type: none"> • acetic acid (70% or more) • gasoline • methyl ethyl ketone, ethyl acetate, butyl acetate • ethyl methacrylate, ethyl ether, MEK • acetone, m-amino alcohol, carbon tetrachloride • carbon disulfide, trichloroethylene, cresol • thinners, oil of turpentine • triethanolamine, TCP, TBP
C	Melted { } : Used as solvent.	<ul style="list-style-type: none"> • concentrated sulfuric acid • benzene • styrene, acrylonitrile, vinyl acetate • ethylenediamine, diethylenediamine • chloroform, methyl chloride, tetrachloromethane, dioxane, { 1, 2-dichloroethane }
D	Decomposed	<ul style="list-style-type: none"> • ammonia water • other alkali

4. During $100\mu s$ after turning on V_{CC} , output voltage changes for stabilizing the inner circuit.
5. Supply the by-pass condenser up to $0.01\mu F$ between V_{CC} and GND near device to stabilize the power supply line.







POSITIONING OF SHUTTER AND DEVICE

To operate correctly, make sure that the shutter and the device are positioned as shown in the figure below.

The slit pitch of the shutter must be set wider than the slit width of the device.
Determine the width taking the switching time into consideration.

